

SLURC/DPU Action-Learning Alliance

Understanding urban risk traps in Freetown

MSc Environment and Sustainable Development
Practice Module 2017-18

POLICY BRIEF No 1 The Reality of Living amidst Floods and Mudslides in Freetown, Sierra Leone

Key points

- **Four kinds of urban floods** can be found in Freetown, thus exposing the city and its inhabitants to multiple risk traps
- A growing population, unplanned urbanisation and a low capacity to enforce policies, contributes towards **land cover changes** (deforestation, coastal and river bed constructions, land reclamation...) which exacerbates risks associated with floods and mudslides.
- **Loose institutional communication channels** restrict aid responses and disaster risk management, at community, regional, national and international levels
- As the city continues to develop in risk prone areas (i.e. where two rivers converge or along the coast), there is a **need for improved infrastructure** to mitigate risk.
- The increase in frequency and intensity of floods and mudslides due to natural and human induced factors, **reinforces the accumulation of risk** amongst informal settlement dwellers.

Authors

Asra SUMBAI, Christina WARWICK, Elliott AGUIRRE, Ha Yeon KIM, Nannette BALFOUR-LYNN, Osman KOCINI, Peter Korsi SIMPSON, Philémon POUX

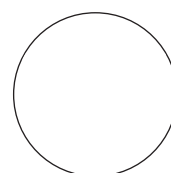


Fig 1: The ruins of buildings from the aftermaths of the mudslide in the Regent area, on the slopes of Sugarloaf Mountain Freetown, Sierra Leone, September 21, 2017.
Photo Credit: Thomson Reuters Foundation / Eromo Egbejule.

Introduction

Freetown, a city squeezed between mountains and the sea in a country that knows the highest annual rainfall in all of Africa is used to dealing with floods and mudslides.[1] However citizens report that the recent political 'failure of action' to address the increase in deforestation, the consequences of unplanned informal urbanisation in risk-prone areas, poor drainage and waste management is intensifying the problem.[1]

According to the United Nations Development Programme, there are myriad man-made and natural factors influencing the cascading risks associated with floods and mudslides in Freetown, Sierra Leone.[2] This brief will investigate the drivers and pressures contributing to this causal chain, how human activity is exacerbating the risks, the types of risk and how they are manifested spatially. From the spatial analysis, we examine who is most vulnerable and to which type of flooding, before reviewing the current coping mechanisms in place and the stakeholders supporting these initiatives to protect the community from future disasters. The brief concludes with several minor and easily achievable suggestions of practices that would lessen the impact of floods and mudslides in Freetown.



Drivers and Pressures

Floods and mudslides in Sierra Leone, along with their associated risks, stem from various drivers and pressures that have created the conditions Freetown is facing today. The city's population has increased rapidly through a combination of push and pull factors such as internal migration patterns during the civil war and a growing economy linked to international investment and trade post civil war.[3] Added to

the limited availability of alternative living arrangements and safe land for housing, residents (mainly the urban poor but not exclusively) have been forced to settle in risk prone areas along coastal and river bed lands, as well as the mountain slopes. The expansion of informal settlements, of which Freetown is home to 61[4], coupled with little to no enforcement of urban planning, building plans and regulation, have

led to drastic land cover changes which are themselves exacerbating the risk of floods and mudslides[5]. These include land reclamation, ecosystem degradation, deforestation, mangrove destruction and the alteration of river flows. These activities, directly impacting Freetown's microclimate, intensify the effects of climate change in the region, thus exacerbating the frequency and intensity of local rainfall.[6]



Fig 2: Abundance of Waste in Freetown due to overstretched infrastructure and limited services . Photo Credit: Crisis Response [7]

Current Situation

Freetown was initially planned for 300,000 people but with its current population over 1.1 million, its resources and infrastructure are overstretched[8]. Furthermore, Freetown experiences 90% of its yearly rainfall in a very intense rainy season during July and August[9], rendering the few drains and sewage systems, which only tend to a small section of the city, useless.

The risky sprawl of the city has not yet been addressed and the Director of Conservation Development Services in Sierra Leone stated: "people are building everywhere and anywhere with impunity"[4]. Settling on the mountain sides, causes

severe deforestation, lessening natural water retention and increasing water and mud runoff in times of heavy rain, thus reinforcing the occurrence of flash floods and mudslides. Constructions encroaching on river beds and coastal areas restrict the natural flow of water as well as water run off, thus causing rivers to leave their beds

Another factor is waste management. As there are very few formal roads for waste collection vehicles to operate in informal settlements, waste accumulates, people dump their rubbish in dumpsites that are seldom cleared, drains become blocked and flash floods from the mountains down to the coast end

up spreading the waste along its path of destruction[8]. In addition, the location of Freetown's major landfill sites, which are full, happen to be upstream from large informal settlements. Figure 2 illustrates the amount of waste accumulating in informal settlements.

Furthermore, resilience and coping capacity are limited and uneven. Figure 3 illustrates the vulnerability to contamination in informal settlements. Whilst the right side of the river bank has a concrete construction and cement block buildings, the left side has no barrier to protect the informal settlement from waste contamination.



Fig 3: Poor sanitation in drainage. Photo Credit: Frazer-Williams [5]

The overall risks associated with these natural disasters are varied and include death, disease and damage to households and possessions. However, apart from these initial consequences, other cascading risks appear such as the heavy flow of waste and debris (including faecal sludge), leading to the destruction of households and the possible contamination of water sources, which may in turn, bring about health risks and waterborne diseases, and the disruption of services, the use of manpower to provide relief (forcing people to take time off from work), income loss and the pollution of coastal waters impacting local ecosystems, fishing and thus the local economy.

How Floods and Mudslides impact Freetown Spatially

Freetown is in the unusual situation of experiencing four types of urban flooding.[10] Localised flooding occurs mainly in areas built upon wetlands, such as Konga Town (See Figure 4a).

Small streams and major rivers as pinpointed on the Fig 4A, flow through dense urban areas, and often converge in and around informal

settlements.

Lastly, coastal flooding is pronounced around river estuaries where tidal backflows flood the coastal land mass. Kroo bay (see Fig 4b) for example, one of the largest coastal settlements situated by an estuary, has flooded every year since 2008.[4]

Mudslides, which are highly corre-

lated with topography, geological structures, rainfall intensity and duration, impact the flow of debris mostly in the densely populated northern part of Freetown where two streams meet (Regent, Kanigo, New England, Kissy brook, Congo town, Madongo Town).[12]



Fig 4a: Encroachment of wetlands in Konga town. Left 2006, right 2017
Photo Source: Google Earth



Fig 4b: Land reclamation in Kroo Bay over time. Left 2006, right 2017
Photo Source: Google Earth

The occurrence of the various types of floods have been mapped in

Figure 5. Here, we highlight the correlation between the location of

informal settlements, coastal areas, river paths, and mudslides.

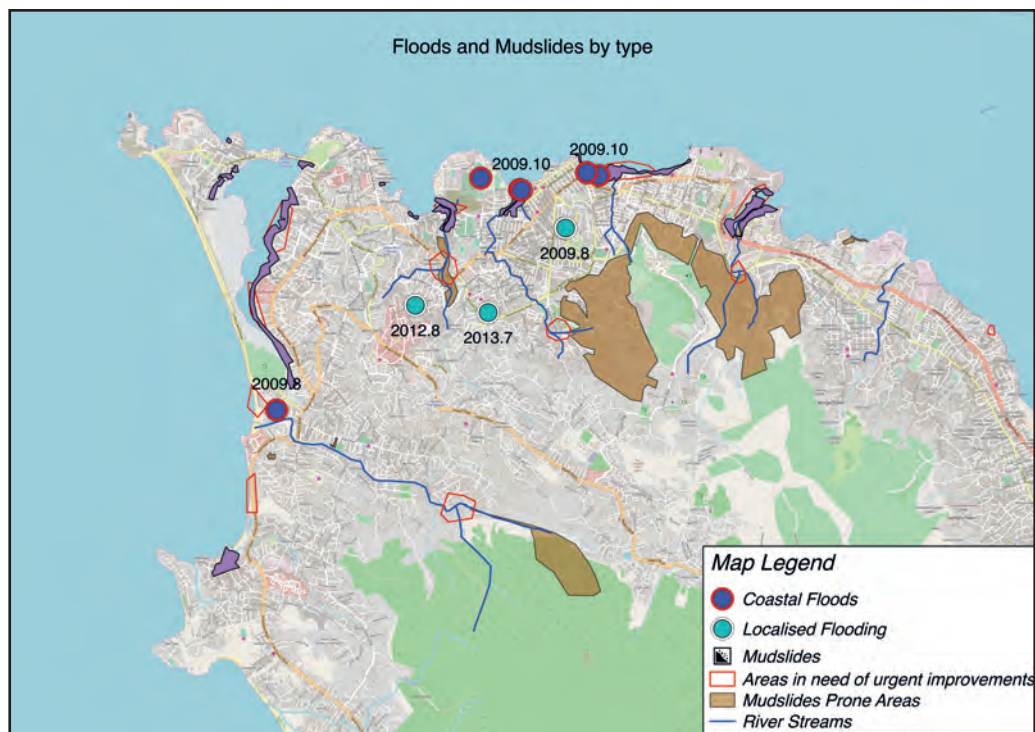


Fig 5: Spatial Mapping of Urban Flooding and Mudslides in Freetown. Data Source: Desinventar[11]

Who is Most Affected Within the City?

Though floods and mudslides affect both formal and informal areas of Freetown, increased exposure and a reduced coping capacity make the latter more vulnerable to these hazards. The spatial distribution of informal settlements in Freetown is such that they have developed sporadically, wherever land was available, leading to an uneven

distribution. These pockets of informality are often located in areas more prone to the risks associated with floods and mudslides. The spatial analysis of Freetown reveals the possibility of all four types of floods occurring concurrently in the coastal areas, increasing the severity of risks in that region (loss of lives and property, homelessness, untre-

ated disease outbreak, lack of access to basic services, disruption of livelihoods etc).[13]

Furthermore, exposure to risk varies according to physical components such as location, the type of flooding and infrastructure capacity, as well as human factors such as gender, age and coping mechanisms.

Floods and Gender relations

Despite a shortage of studies on the impact of floods and gender relations globally, (let alone in western Africa).[14] epidemiologic evidence and a global consensus that the topic of women and the effects of flood and mudslide needs greater attention suggests that women are most exposed to the impact of these natural disasters.[15] For instance, an analysis of the 1993 flood in Nepal shows that the fatality rate (per 1000) was 8.6 for female to 6.0 for males (with a relative child/adult difference of about 2.2).[16] Other studies highlight that experiencing a flood whilst pregnant can lead to a low birth weight, higher risks of complications during pregnancy, and greater chances of being exposed to viral water-borne diseases. [17]–[19] Sultana points out that culturally embedded roles, whereby many

women are homebound, tend to reinforce their vulnerability to floods and mudslides.[14] Even with little scientific data to substantiate which demographic is most affected by the four types of urban floods in Freetown, a clear correlation showing that women and children are disproportionately affected, can be found between the amount of time spent at home and the degree of exposure to the associated risks, thus showing that women and children are disproportionately affected.

Localized flooding occurs regularly, and is more likely to affect those spending the majority of their time in the area. In the case of Freetown, localized flooding mostly occurs in residential areas, and as women are traditionally responsible for household activities they typically take on the burden of getting

flood water out of the house, thus putting themselves (along with children and the less agile) more at risk.

Similarly, the **flooding of small streams, major rivers and coastal flooding** has a greater impact on women and young children as they tend to clear the household of debris in the aftermath of these disasters, a process exposing them to contaminated waste water along with other risks. Coupled with the responsibility of ensuring the safety of children during these disasters increases vulnerability. According to the Office of National Security of the Government of Sierra Leone, about 56% of affected persons in the August 2017 flood and mudslide disaster were children between the age of 1 and 19.[20]

*“When the rain and the floods come, **women and children suffer**. You can be locked up for up to two days with the flood. Sometimes, we take our children out from the room to the rooftop.”*

A woman in Accra, Ghana[13]



Fig 6: Women Evacuating Flooded Homes in Regent, Freetown in 2017
Photo Credit: Society For Climate Change Communication Sierra Leone/AFP

The Role of Local, International and Governmental Actors

Official sources delineating **governmental emergency responses** to floods and mudslides in Freetown, combined with news of discussions to improve humanitarian operations in the country, depict the Sierra Leonean government in a favourable light.[21] Reports published by the International Office of Migration (IOM) state that prior to recent floods they ‘had been supporting national authorities and local organizations in Sierra Leone through capacity building in disaster preparedness, displacement management and data collection’.[21] The Office of National Security in Sierra Leone (ONS), responsible for the overall coordination of disaster management, published a report that would make us believe their preparedness to deal with such incidences. *Landslide and Flooding Response* from the 14th

August 2017, a document that gathers data about the impact of floods and mudslides among local Freetown communities, outlines the government’s immediate, medium and long-term response strategy that aims to tackle everything from financial support, food and shelter to policy changes, disease prevention and improvements to infrastructure and city planning! (Fig 7).[20]

Despite these claims, citizens directly affected by floods and mudslides paint a different picture of reality on the ground. Community leaders report difficulties in accessing donated supplies from foreign aid, claiming that a series of complicated protocols result in requests going unanswered and needs not being met.[10] This inefficiency,

echoed throughout the government’s responses to the risks associated with floods and mudslides, exacerbates the long-standing tensions between community and government, increasing the importance of international aid.[22]

International organisations such as Cordaid, Caritas Sierra Leone, Red Cross, ActionAid, Save the Children and inter-agency aid from foreign governments’ committed to enhancing emergency relief through international funds are said to play a crucial role in post disaster recovery by searching for missing persons, distributing core relief items, responding to urgent medical needs etc.[20] Sierra Leone’s first ever Oral Cholera Vaccination campaign, launched in 2017 intends to impact 500,000 people (UNICEF, 2017)¹ This kind of inter-agency collaboration, (supported by

CARING FOR AFFECTED PERSONS (IMMEDIATE)	PROTECTING THE WIDER COMMUNITY (MEDIUM TERM)	BUILDING BACK BETTER (LONG TERM)
<p>PROVISION OF CASH TRANSFERS, TEMPORARY SHELTER, FOOD AND NON-FOOD ITEMS, FREE HEALTH CARE. WASH FACILITIES FOR SHELTERS, PSYCHOSOCIAL, EDUCATIONAL AND LIVELIHOOD SUPPORT, CONSTRUCTION OF AFFORDABLE HOUSING AND PERMANENT RELOCATION</p>	<p>CHOLERA AND OTHER DISEASE PREVENTION, PSYCHOSOCIAL AND OTHER SUPPORT TO DISASTER RESPONDERS, WASH COMMUNITY LEVEL INTERVENTIONS, REPAIR/REPLACEMENT OF CRITICAL INFRASTRUCTURE (BRIDGES, ROADS, ELECTRICITY, WATER SUPPLIES, SECONDARY EVENT RESPONSE POLICY AND PREPARATION, REPAIRS TO DAMAGED MEDICAL FACILITIES, ENGINEERING SOLUTIONS TO REDUCE IMMEDIATE RISK OF FLOODING IN DISASTER PRONE ZONES, ENFORCEMENT OF POLICIES IN RESPECT OF THE PROTECTION OF FOREST PROTECTED AREAS</p>	<p>IMPROVEMENTS TO INFRASTRUCTURE, URBAN PLANNING REVIEWS AND SLUM IMPROVEMENTS: IMPROVING RESILIENCE OF CRITICAL INFRASTRUCTURE SYSTEMS (ROADS NETWORK, BRIDGES, ELECTRICITY SUPPLIES, WATER SUPPLIES, TELECOMS), URBAN PLANNING REVIEW AND RECOMMENDATIONS FOR ADDITIONAL SOCIAL HOUSING, IMPROVING SLUM COMMUNITIES AND ENHANCING URBAN PLANNING</p>

Fig 7: Government Response Strategy [20]

WHO, UNICEF, UKaid, MSF and others) is a prime example of the type of programs needed to positively impact the public, raise awareness and mitigate risk.

Community based organizations, such as the Community Disaster Management Committee (CDMC) and the Community Health Workers Committee (CHWs), are stilted by the limited effectiveness of local current coping practices and access to resources, and would greatly benefit from institutional support to enhance the community and the city's resilience.[23] Despite this, these community organisations, with help from the Federation of the Urban and Rural Poor (FEDURP), claim to help increase residents' capacity responses through aware-

ness and self-help. The UNDP has recently established a training programme to educate flood and mudslide affected locals to cope with disasters and establish risk-reducing, sustainable practices. Needless to say, the effects of this kind of support are difficult to evaluate without speaking directly to the relevant communities. Similarly, a brief report by the Sierra Leone YMCA maintains it carried out educational projects in 2012 to reduce the cascading risks associated with floods and mudslides.[24] Despite this community training, an increase in causal links has been noted since, making it difficult to access the success of the programme.

In terms of local coping capacity,

the UNDP provides the example of how communities built into the mountain side reinforce retention walls to help keep water out of their homes. This is a short-sighted solution considering it intensifies the amount and force of the water, 'which then spills into and floods other communities, further downhill'.[2] Other coping practices include transferring valuables to high up shelves and beds, only reachable by climbing a ladder.[10] Yet again demonstrating a far from sufficient protection from the devastating intensity of floods and mudslides in Freetown.



Fig 8: Shelter Sites after the Regent Mudslide, 23rd August 2017
 Source: MapAction, [25]

Conclusion: Suggestions for a more Resilient Freetown

Desinventar[11] has recorded 36 incidences of floods and mudslides in Freetown between 2009 and 2013. Despite the extensive and intensive nature of this problem, coping capacity and the current strategies intended to protect locals from the cascading risks of floods and mudslides remains insufficient. In light of this, it seems crucial to resort to other initiatives that could lessen the impact of such risks. The UNDP proposes clearing drains from waste and rocks in regions such as Dwazark and Firestone or entirely rebuilding drains in areas where riverbanks are being eroded and may eventually collapse, as well as constructing gabions to canalise flowing water and prevent soil erosion. Considering floods and mudslides typically carry waste, faeces and pathogens, thus contaminating drinking wells, building cement walls around these features could improve access to clean water. Another solution entails adopting farming practices that captures more rain in the soil and minimize land erosion.[2]

These are but a handful of practical solutions that would limit the damage brought on by the cascading risks of floods and mudslides. Ideally, these measures would be reinforced with the implementation of a national recovery strategy, the activation of inter-organisational communication channels, educational programmes targeting various socioeconomic groups and greater research into stakeholder vulnerability. Though adopting these protective and preventative measures requires a considerable investment, a failure to engage with these solutions will continue to exacerbate long term financial, socioeconomic and environmental problems. What's more, such measures would weave together a cultural fabric of collaboration by drawing upon the support of local, international and governmental stakeholders.

References

- [1]F. Drury, "Freetown: A disaster waiting to happen?," BBC News, 16-Aug-2017.
- [2]UNDP in Sierra Leone, "The new normal: Living at peace with nature." [Online]. Available: <http://www.sl-undp.org/content/sierraleone/en/home/presscenter/articles/2017/11/20/the-new-normal-living-at-peace-with-nature-.html>. [Accessed: 10-Jan-2018].
- [3]L. R. Mansaray, J. Huang, and A. A. Kamara, "Mapping deforestation and urban expansion in Freetown, Sierra Leone, from pre- to post-war economic recovery," *Environ. Monit. Assess.*, vol. 188, no. 8, p. 470, Aug. 2016.
- [4]J. Hitchen, "Flooding in Freetown: a failure of planning? - Africa Research Institute," Africa Research Institute.
- [5]R. A. D. Frazer-Williams, "Environmental Assessment and Evaluation of Natural Disaster Risk and Mitigation in Freetown," SLURC, Urban Planning Project 2011-1014, 2014.
- [6]I. K. Dumbuya, "Climate Change and surface flooding in Sierra Leone." .
- [7]"CRJ: Disaster management training in Sierra Leone," Crisis Response. [Online]. Available: <http://www.crj.co/r.php?t=2&i=167>. [Accessed: 10-Jan-2018].
- [8]D. Harris, M. Kooy, and G. Jalloh, "The political economy of the urban water-pricing regime in Freetown, Sierra Leone," Lond. ODI, 2012.
- [9]E. Taylor, I. S. Kamara, and A. Bockarie, "Rainfall Pattern in Freetown, Sierra Leone: From a Retrospective Viewpoint. International Conference ADAPTtoCLIMATE; Nicosia Cyprus; 27th -28th March 2014," 2014.
- [10]"Unjust waters: Climate change, flooding and the protection of poor urban communities: experiences from six African cities." ActionAid International, Jan-2007.
- [11]"DesInventar - Sierra Leone," UNISDR Sendai Framework, DesInventar. [Online]. Available: <http://www.desinventar.net/DesInventar/main.jsp?countrycode=sle&lang=EN>. [Accessed: 10-Jan-2018].
- [12]F. Guzzetti, S. Peruccacci, M. Rossi, and C. P. Stark, "The rainfall intensity-duration control of shallow landslides and debris flows: an update," *Landslides*, vol. 5, no. 1, pp. 3-17, Feb. 2008.
- [13]Ian Douglas, Kurshid Alam, Maryanne Maghenda, Yasmin Mcdonnell, Louise Mclean, and Jack Campbell, "Unjust waters: climate change, flooding and the urban poor in Africa," *Environ. Urban.*, vol. 20, no. 1, pp. 187-205, Apr. 2008.
- [14]F. Sultana, "Living in hazardous waterscapes: Gendered vulnerabilities and experiences of floods and disasters," *Environ. Hazards*, vol. 9, no. 1, pp. 43-53, Jan. 2010.
- [15]K. Alderman, L. R. Turner, and S. Tong, "Floods and human health: A systematic review," *Environ. Int.*, vol. 47, no. Supplement C, pp. 37-47, Oct. 2012.
- [16]E. K. Pradhan, K. P. West, J. Katz, S. C. LeClerq, S. K. Khattry, and S. R. Shrestha, "Risk of flood-related mortality in Nepal," *Disasters*, vol. 31, no. 1, pp. 57-70, Mar. 2007.
- [17]V. T. Tong, M. E. Zotti, and J. Hsia, "Impact of the Red River catastrophic flood on women giving birth in North Dakota, 1994-2000," *Matern. Child Health J.*, vol. 15, no. 3, pp. 281-288, Apr. 2011.
- [18]J. T. Watson, M. Gayer, and M. A. Connolly, "Epidemics after Natural Disasters," *Emerg. Infect. Dis.*, vol. 13, no. 1, pp. 1-5, Jan. 2007.
- [19]S. I. Ahmad Bukhari and S. Hassan Rizvi, "Impact of Floods on Women: With Special Reference to Flooding Experience of 2010 Flood in Pakistan," *J. Geogr. Nat. Disasters*, vol. 05, no. 02, 2015.
- [20]"Government of Sierra Leone 14th August landslide and flooding response," Office of National Security, Freetown, Sierra Leone, Sep. 2017.
- [21]"Emergency Operations in Sierra Leone as Government, UN Agencies Respond to Floods," International Organization for Migration, 18-Aug-2017. [Online]. Available: <https://www.iom.int/news/emergency-operations-sierra-leone-government-un-agencies-respond-floods>. [Accessed: 10-Jan-2018].
- [22]C. Inveen, "Failed promises: survivors of deadly mudslide left homeless by Sierra Leone government," *The Guardian*, 21-Nov-2017.
- [23]"Sierra Leone respond to flooding," Restless Development, 16-Aug-2017. [Online]. Available: <http://restlessdevelopment.org/news/2017/08/16/restless-development-sierra-leone-respond-to-flooding>. [Accessed: 10-Jan-2018].
- [24]"Sierra Leone youth led community-based Disaster Risk Reduction," Y-Care International, 2013.
- [25]"Sierra Leone Landslide & Floods Shelter Sites as of 23 August 2017," MapAction. [Online]. Available: <https://maps.mapaction.org/dataset/sierra-leone-landslides-ma011-v2>. [Accessed: 10-Jan-2018].